CLAIMS

What is claimed is:

1. A method for determination of a dynamic property of a fluid volume, comprising, determining the distribution or location or both of at least one light scattering particle in said fluid volume by detecting light scattered from said at least one particle.

2. The method of claim 1, wherein said dynamic property is flow rate.

3. The method of claim 1, wherein said dynamic property is particle distribution in said fluid volume.

4. The method of claim 3, wherein probes are present in said fluid volume and said particle distribution is indicative of the distribution of said probes in said fluid volume.

5. The method of claim 4, wherein said distribution of probes is on a solid phase surface.

6. The method of claim 1, wherein said dynamic property is uniformity of drying on a solid surface.

7. The method of claim 1, wherein said dynamic property is a flow pattern in a device or portion of a device, said device being an article of manufacture including one or more channels or reservoirs for fluid.

8. The method of claim 7, wherein said dynamic property is fluid mixing being evaluated in one or more portions of said device or through the entire device, said portions being selected from the group consisting of a mixing chamber, a port, a flow channel, a pump, a valve, and a flow channel intersection.

9. The method of claim 1, wherein said fluid volume is in a small volume device.

10. The method of claim 9, wherein said small volume device is selected from the group consisting of a micro volume device, a nano volume device, and a pico volume device.

11. The method of claim 9, wherein said small volume device is selected from the group consisting of an array chip, array plate, or array slide;

12. The method of claim 9, wherein said small volume device is a membrane or porous matrix.

13. The method of claim 9, wherein said small volume device is selected from the group consisting of a pump; a port, a channel junction, and a valve.

14. The method of claim 9, wherein said small volume device comprises an array comprising a plurality of features and has deposited on each feature a volume of 10 pL to 10 nL.

15. The method of claim 9, wherein said small volume device comprises an array comprising a plurality of features and has deposited on each feature a volume of 10 nL-200nL.

16. The method of claim 9, wherein said small volume device comprises an array comprising a plurality of features and has deposited on each feature a volume of 200 nL to 2 microliters.

17 ~~16.~~ The method of claim 9, wherein said small volume device is a microchannel device, comprising at least one microchannel of sufficient size to allow fluid flow.

18 ~~17.~~ The method of claim 1, wherein said at least one particle comprises a plurality of distinguishable particles.

19 ~~18.~~ The method of claim 17, wherein said plurality of distinguishable particles is used to analyze mixing of fluids from two different sources.

Rule 1.126

20
~~19.~~ A method for analyzing deposition characteristics of features on an array, comprising

depositing at least one fluid volume on a portion of a solid substrate, wherein said fluid volume contains a plurality of light scattering particles;

detecting the distribution or number or both of said light scattering particles by detecting light scattered from said particles,

wherein the distribution or number or both of said particles is indicative of one or more deposition characteristics.

21
~~20.~~ The method of claim 19, wherein said deposition characteristic is uniformity of deposition, wherein said uniformity is evaluated by determining at least one of the properties selected from the group consisting of a 2-dimensional distribution of particles within at least one feature, deposition volume, and uniformity of particle number in deposited fluid volumes.

22
~~21.~~ The method of claim 19, wherein said deposition characteristic is a drying pattern.

23
~~22.~~ The method of claim 19, wherein said array has bound thereto a plurality of probe molecules and said distribution of particles is indicative of the distribution of probe molecules deposited on said array.

24
~~23.~~ The method of claim 22, wherein said distribution of probe molecules is a distribution during drying of said at least one feature.

25
~~24.~~ The method of claim 22, wherein said distribution of probe molecules is a distribution during or after post-spotting processing of said at least one feature.

26
~~25.~~ The method of claim 19 wherein said deposition characteristic is indicative of functional binding on said at least one feature, wherein said functional binding is a nucleic acid-probe hybridization, protein-protein interaction, or ligand-receptor binding.

27
~~26.~~ The method of claim 19, wherein said array comprises at least 10 features.

28
~~27~~. The method of claim 19, wherein said array comprises at least 100 features.

29
~~28~~. The method of claim 19, wherein said array comprises at least 1000 features.

30
~~29~~. The method of claim 19, wherein said array comprises at least 10,000 features.

31
~~30~~. The method of claim 19, wherein said array comprises greater than 10,000 features.

32
~~31~~. A method for analyzing fluid flow in at least one portion of a small volume device, comprising

illuminating a suspension of light scattering particles in at least one portion of said device; and

detecting the presence of said light scattering particles as an indication of said fluid flow.

33
~~32~~. The method of claim 31, wherein a plurality of different light scattering particles are inserted in said device, and said plurality of different particles are detected as an indication of said fluid flow.

34
~~33~~. The method of claim 31, wherein said at least one portion is a plurality of portions of said device.

35
~~34~~. The method of claim 31, wherein said flow is detected using extended exposure, whereby said light scattering particles provide flow tracers.

36
~~35~~. A method for analyzing at least one characteristic of a solid or porous substrate, comprising

treating at least a portion of a sample of said substrate with at least one fluid volume containing a plurality of light scattering particles; and

detecting the distribution or number or both of said light scattering particles on said at least a portion of said sample by detecting light scattered from said particles,

wherein the distribution or number or both of said particles is indicative of said at least one characteristic.

37
~~36.~~ The method of claim 35, wherein substrate is a solid substrate and said characteristic is a surface characteristic.

38
~~37.~~ The method of claim 35, wherein said substrate is a porous matrix.

39
~~38.~~ The method of claim 36, wherein said at least one characteristic is selected from the group consisting of surface uniformity, uniformity of one or more surface coatings, uniformity of surface charge, uniformity of surface hydrophilicity, uniformity of surface hydrophobicity, and uniformity of surface charge density.

40
~~39.~~ The method of claim 35, wherein said substrate is selected from the group consisting of a glass substrate, a functionalized glass substrate, a plastic substrate, a silicon substrate, a membrane substrate, and a metallic substrate.

41
~~40.~~ The method of claim 37, wherein said porous matrix is selected from nitrocellulose, polyvinylidene fluoride, and nylon.

42
~~41.~~ The method of claim 37, wherein said at least one characteristic is selected from the group consisting of matrix uniformity, uniformity of one or more coatings, uniformity of charge, uniformity of hydrophilicity, uniformity of hydrophobicity, and uniformity of charge density.